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(54) Title: FOAMING PERSONAL CLEANSING PRODUCT WITH FOAM ENHANCING POLYMER

(57) Abstract

A liquid personal cleansing composition, packaged in a squeeze foamer container, which contains a low level of preferably mild surfactant and a low level of a foam enhancing polymer in an aqueous solvent. A rich, creamy foam is dispensed from the squeeze foamer for effectively cleansing the skin. The product is very mild. The composition can contain minimal amounts of organic materials so as to minimize effects on the environment and can be easily prepared from a concentrate by the ultimate consumer.

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FOAMING PERSONAL CLEANSING PRODUCT WITH FOAM ENHANCING POLYMER

FIELD OF THE INVENTION

This invention pertains to personal cleansing compositions for personal washing, especially of the face.

BACKGROUND OF THE INVENTION

Liquid and solid bar compositions based on soap and/or synthetic surfactants are commonly used for cleansing the human body. To achieve adequate lather when diluted with water, these require a higher level of surfactant than is necessary for cleaning. This excess surfactant can be irritating to the skin and is put into the environment unnecessarily. The use of foams for cleaning skin has usually been reserved for specialty products that are used without rinsing. See, e.g., U.S. Pat. No. 3,962,150, Viola, issued June 8, 1976, incorporated herein by reference. There has been little or no recognition of the mildness and environmental advantages that can be derived from the use of such products for general cleansing. The level of surfactant actually required to provide good cleaning of the skin is quite low and the majority of the detergent surfactant in the usual toilet bar is wasted, either in the smear that is left on the bar holder, or in detergent surfactant that is not fully dissolved and is therefore rinsed away without providing any benefit. When a mechanical foaming device is used, lower levels of surfactant can be used to achieve adequate lather. However, as the surfactant level is minimized, lather quality is also reduced and the foam quality can be of a poorer quality than that of better toilet bars.

SUMMARY OF THE INVENTION

The present invention relates to liquid personal cleansing products (compositions) containing low levels, e.g., from about

0.1% to about 16% of detergent surfactants, preferably mild detergent surfactants, and low level of foam enhancing polymer in an aqueous solvent system, said compositions being packaged in a container that can be manipulated by an individual to produce a foam (squeeze foamer container). The compositions of this invention preferably have a very low content of detergent surfactant to minimize adverse effects both to the skin and to the environment. The quality of the foam can be enhanced, surprisingly, without adversely affecting the ability to dispense the product, by raising the viscosity by the addition of a small amount of a polymer. It is very surprising that foam quality and viscosity are so intimately related. Only very small differences of viscosity are required to make substantial differences in the foam quality.

DETAILED DESCRIPTION OF THE INVENTION

The present invention comprises a personal cleansing composition in the form of an aqueous liquid comprising: (1) from about 0.1% to about 16%, preferably from about 1% to about 8%, more preferably from about 2% to about 6% of detergent surfactant, preferably mild detergent surfactant; and (2) from about 0.01% to about 5%, preferably from about 0.04% to about 2% of foam enhancing polymer.

The "delta viscosity" is the difference between the viscosity of a composition with and without the viscosity enhancing polymers. The foam enhancing polymer accounts for a rise in the viscosity of the composition (without the polymer) of at least about 1 centipoise, preferably by from about 2 to about 10 centipoise, more preferably by from about 2 to about 5 centipoise. The increase in viscosity increases the composition's Foam Creamy Feel Rating as described in more detail hereinafter, so that said Foam Creamy Feel Rating is raised by at least about 0.5, preferably by at least about 1, more preferably by at least about 2. In other words, the compositions's Foam Creamy Feel Rating without the polymer is at least 0.5 lower than the composition with the polymer.

The composition of this invention preferably has a viscosity of at least about 1.5, preferably from about 2 to about 15, more preferably from about 2 to about 12, and even more preferably from

about 3 to about 10 centipoise at 21°C when measured using a Brookfield LVT Viscometer with a UL adapter. The lower viscosity limit is set by the quality of the foam and that varies with the surfactant system. In general, the upper viscosity limit is as high as can be tolerated as long as the product can be easily dispensed; thus viscosities of 20, 30, and even 40 cps are included within the scope of this invention. The more preferred composition is made from a formulation which has a viscosity in the range of from about 1 to about 5 cps without the polymer. The compositions of the present invention preferably have a Foam Creamy Feel Rating, as defined hereinafter, of at least about 5, preferably around or about 6. Foam Creamy Feel Ratings of about 7 and above are also desirable for some products.

Squeeze foam compositions without polymer can be formulated using higher levels of surfactant, 10-25%, preferably 15-20%, and achieve Foam Creamy Feel Ratings of 6, 7 or 8.

Compared to personal cleansing compositions that are in the form of toilet bars, the compositions of the present invention are extremely mild. The use of less detergent surfactant makes any detergent surfactant milder and the use of a squeeze foamer package makes the resultant foam more acceptable to the consumer without the need to use more aggressive detergent surfactants for increased foam.

From an environmental standpoint, as discussed hereinbefore, the invention uses less organic material and by using less material and no propellant, simplifies the use of concentrates by the eventual consumer to form the composition. This minimizes the need to continually sell the squeeze foam dispenser.

The compositions of this invention comprise from about 60% to about 99% water, preferably at least about 75%, water, and a minor amount of other suitable solvents. Higher levels of water and lower levels of organic materials are desirable to minimize environmental concern.

The Surfactant Component

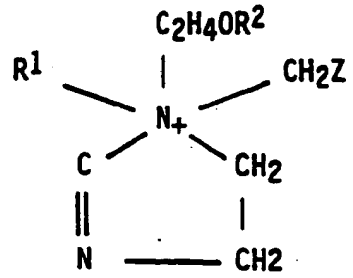
The surfactant component of the present compositions comprises water-soluble, e.g., alkali metal, ammonium, or substituted ammonium synthetic, or soap, detergent surfactant or mixtures thereof.

The compositions of this invention preferably contain up to about 15%, preferably from about 1% to about 8%, of synthetic detergent surfactant, preferably mild synthetic detergent surfactant. Preferably the synthetic detergent surfactant is mild, as disclosed in commonly assigned U.S. Pat. No. 4,673,525, Small et al., issued June 16, 1987, incorporated herein by reference. A mild synthetic detergent surfactant is defined therein, and herein, as one which does relatively little damage to the barrier function of the stratum corneum.

Synthetic detergents are the preferred detergent surfactants in the compositions herein. Preferred types of synthetic detergent surfactants are of the anionic, amphoteric, or zwitterionic types. Preferably, the detergent surfactants are those known to be mild to the skin.

Many mild surfactants are low foaming. The present invention offers an advantage for such low foaming surfactants.

Preferred compositions herein contain a mixture of two amphoteric surfactants, a first amphoteric surfactant being selected from imidazolinium surfactants of Formula I:



(I)

wherein R^1 is C_8-C_{22} alkyl or alkenyl, R^2 is hydrogen or CH_2CH_2M, Z is CO_2M or CH_2CO_2M and M is H, alkali metal, ammonium or alkanolammonium;

and a second amphoteric surfactant being selected from amino-alkanoates of Formula II:

$$R^1NH(CH_2)_nCO_2M \qquad (II)$$

iminodialkanoates of Formula III:

$$R^1N[(CH_2)_mCO_2M]_2 \qquad (III)$$

and mixtures thereof, wherein n and m are numbers from 1 to 4, and each R^1 and M are independently selected from the groups specified

in (I) above.

Examples of suitable amphoteric surfactants for use as the first amphoteric surfactant include compounds in which R^1 is C_8H_{17} (especially iso-capryl), C_9H_{19} and $C_{11}H_{23}$ alkyl. Especially preferred are the compounds in which R^1 is C_9H_{19}, Z is CO_2M and R^2 is H; and the compounds in which R^1 is $C_{11}H_{23}$, Z is COM and R^2 is CH_2CO_2M.

It will be understood that a number of commercially available amphoteric surfactants of this type are manufactured and sold in the form of complexes with anionic surfactants, especially those of the sulfated C_8-C_{18} alcohol or C_8-C_{18} acyl glyceride types. In one aspect of the invention therefore, the compositions comprise a premix or complex of the first amphoteric surfactant and anionic surfactant in an equivalent ratio of about 1.1 in order to provide approximate electroneutrality.

Some preferred mild synthetic detergent surfactants useful in this invention include alkyl glyceryl ether sulfonate (AGS); anionic acyl sarcosinates; methyl acyl taurates; fatty acyl glycinates; N-acyl glutamates; alkyl glucosides; acyl isethionates; alkyl sulfosuccinate; alpha-sulfonated fatty acids, their salts and/or their esters; alkyl phosphate esters; ethoxylated alkyl phosphate esters; alkyl ether sulfates; glucose esters and alkylated, e.g., methyl glucose esters; acylated and/or alkylated protein condensates; mixtures of alkyl ether sulfates and alkyl amine oxides; betaines; sultaines; and mixtures thereof. Included in the surfactants are the alkyl ether sulfates with 1 to 12 ethoxy groups, especially ammonium and sodium lauryl ether sulfates. Alkyl and/or acyl chain lengths for these surfactants are C_8-C_{22}, preferably C_{10}-C_{18}.

Preferred mild synthetic detergent surfactants include: C_8-C_{18} monoalkyl phosphate salts, preferably at least partly in the form of their polyalkanol, e.g., N,N,N'N'-tetraethanol-(ethylenediamine) (Quadrol) salts; N-(C_8-C_{18} fatty acyl) glutamates; C_8-C_{18} alkyl imino acetates and/or imino propionates; preferably propionates; C_8-C_{18} fatty acyl glycinates and/or their mixtures with additional anionic synthetic detergent surfactant, and/or mixtures thereof.

Examples of anionic synthetic detergents are the salts of organic sulfuric reaction products such as

(a) alkyl sulfates having the formula $R_{24}OSO_3M$;

(b) alkyl sulfonates having the formula $R_{24}SO_3M$;

(c) alkyl ether sulfates having the formula $R_{24}(OC_2H_4)_xOSO_3M$;

(d) alkyl monoglyceride sulfonates having the formula $R_{24}OG_{1-2}\text{-}SO_3M$; and

(e) alkyl benzene sulfonates having the formula:

In the above formulae, each R_{24} is a straight or branched chain alkyl of from about 8 to about 24 carbon atoms; each G is a glyceryl ether moiety; each x is a number of from 1 to about 10; and each M is an alkali metal, ammonium, or substituted ammonium ion.

Examples of nonionic synthetic detergents are ethoxylated fatty alcohols (e.g., the reaction product of one mole of coconut fatty alcohol with from about 3 to about 30 moles of ethylene oxide) and fatty acid amides such as coconut fatty acid monoethanolamide and more pure cuts such as lauric, myristic or stearic acid diethanolamides. The nonionic surfactants disclosed in U.S. Pat. 3,962,150, supra, can be used in the compositions of the present invention.

One kind of preferred composition is substantially free of soap and has a pH of from about 4.5 to about 8.5, preferably from about 6 to about 8.

It may also be desirable to use soap, e.g., alkali metal soap as the detergent surfactant. Such soap can be made by direct saponification of fats and oils or by the neutralization of free fatty acids which are prepared in a separate manufacturing process. Particularly useful are sodium, potassium and alkanolammonium, e.g., triethanolammonium, salts of mixtures of fatty acids derived from coconut oil and tallow, i.e., sodium and potassium tallow and coconut soaps.

The term "tallow" is used herein in connection with fatty acid mixtures which typically have an approximate carbon chain

length distribution of 2.5% C_{14}, 29% C_{16}, 23% C_{18}, 2% palmitoleic, 41.5% oleic and 3% linoleic. (The first three fatty acids listed are saturated.) Other mixtures with similar distributions can be used, such as the fatty acids derived from various animal tallows. The tallow can also be hardened (i.e., hydrogenated) to convert part or all of the unsaturated fatty acid moieties to saturated fatty acid moieties.

When the terms "coconut oil" and "coconut fatty acid" (CNFA) are used herein, they refer to fatty acid mixtures which typically have an approximate carbon chain length distribution of about 8% C_7, 7% C_{10}, 48% C_{12}, 17% C_{14}, 9% C_{16}, 2% C_{18}, 7% oleic, and 2% linoleic. (The first six fatty acids listed are saturated.) Other sources having similar carbon chain length distribution such as palm kernel oil and babassu kernel oil are included with the terms coconut oil and coconut fatty acid.

As stated hereinbefore, the preferred detergent surfactants are the mild synthetic surfactants disclosed in U.S. Pat. No. 4,673,525, Small et al., issued June 16, 1987, incorporated herein by reference.

The Polymers

It has been discovered that the addition of certain polymeric materials to liquid cleansing compositions that are designed to be foamed in a squeeze foamer container, as described in detail hereinafter, can provide more acceptable foam without hurting other product properties. In general, the useful polymers should be either soluble or dispersible in water to a level that will give the desired viscosity increase. Suitable polymers are high molecular weight materials (mass-average molecular weight determined, for instance, by light scattering), being generally from about 2,000 to about 3,000,000, preferably from about 5,000 to about 2,500,000, and more preferably from about 7,000 to about 1,000,000). Since the polymers apparently operate by raising the viscosity of the compositions, the polymers preferably have a thickening ability such that a 1% dispersion of the polymer in water at about 21°C (70°F) exceeds about 1 centipoise, preferably about 2 centipoise. Useful polymers are the cationic, nonionic, amphoteric, and anionic polymers useful in the cosmetic field.

Preferred are cationic and nonionic resins and mixtures thereof, especially those that are beneficial to the skin. Also preferred are cellulose derivatives such as hydroxyethyl- and carboxymethyl-cellulose and guar gums such as hydroxypropyltrimethylammonium guar gum. Since the polymers are added to raise the viscosity, the compositions preferably should not contain large amounts of materials that reduce the viscosity and especially material that has no function except to reduce the viscosity.

Personal cleansing products containing quaternary amine polymers are disclosed in one or more of the following patents:

Pat. No.	Date	Inventor(s)
US 3,761,418	9/1973	Parran, Jr.;
US 4,234,464	11/1980	Morshauser;
US 4,061,602	12/1977	Oberstar et al.;
US 4,472,297	9/1984	Bolich et al.;
US 4,491,539	1/1985	Hoskins et al.;
US 4,540,507	9/1985	Grollier;
US 4,673,525	6/1987	Small et al.;
US 4,704,224	11/1987	Saud; and
Jap. J57105	6/30/82	Pola.

All of the above patents are incorporated herein by reference, especially for their basic personal cleansing product and polymer disclosures.

As stated above, the polymers useful herein are any of the typical polymers that provide an increase in viscosity. The substituted cellulose materials preferred herein are commonly found in detergent compositions and are suitable for use in compositions that come in contact with the skin. Especially preferred are the substituted cellulose polymers that are readily water-soluble or water-dispersible, and especially those that form clear solutions while raising the viscosity when used at low levels. Examples of such polymers are the carboxymethyl- and ethoxylated cellulose polymers.

Specific examples include: hydroxyethyl cellulose (e.g., Natrosol 250MXR, Natrosol 250HR, etc.); and cationic cellulose polymers (e.g., Union Carbide's JR-400).

Other anionic, nonionic, and cationic polymeric skin conditioning agents useful in the present invention have molecular

weights of from 1,000 to 3,000,000. Useful polymers are selected from the group consisting of:

(I) nonionic, anionic, and cationic polysaccharides;

(II) copolymers of the saccharides of (I) and compatible synthetic monomers;

(III) synthetic water-soluble polymers containing water-soluble groups, e.g., quaternized silicones and quaternized polycarboxylates.

Specific examples of members of the cationic polysaccharide class include the cationic hydroxyethyl cellulose, e.g., JR-400 and LM-200 made by Union Carbide Corporation.

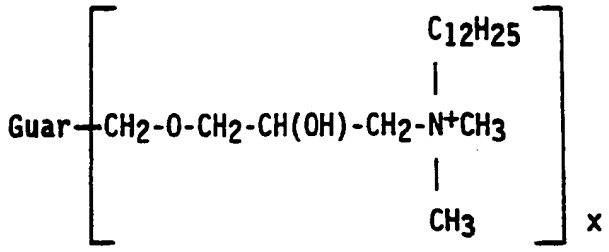
Copolymers of saccharides and synthetic monomers useful in the present invention encompass those containing the following saccharides: glucose, galactose, mannose, arabinose, xylose, fucose, fructose, glucosamine, galactosamine, glucuronic acid, galacturonic acid, and 5 or 6 membered ring polyalcohols. Xanthan gum, e.g., Keltrol T, (molecular weight about 2,000,000) is also a suitable polymer. Also included are hydroxymethyl, hydroxyethyl and hydroxypropyl derivatives of the above sugars.

Other desirable polymers are the bulky amine polymers as defined in the copending U.S. Patent Application of Robert G. Bartolo and Louis F. Wong, Ser. No. 07/374,315 filed June 30, 1989, for "PERSONAL CLEANSING PRODUCT WITH ODOR COMPATIBLE BULKY CATIONIC POLYMER," said application being incorporated herein by reference. Such polymers have the following generalized formula in which the backbone is represented by "POLYMER" and having the indicated non-labile cationic functional group:

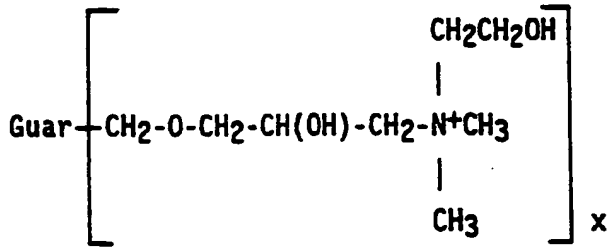
(I) (POLYMER)-$(CR^1H\text{-}CR^2R^3\text{-}NR^4R^5R^6)_x$ wherein R^1-R^3 is H or any other substituent and R^4, R^5 and R^6 combine with N to form an amine with less odor impact than trimethylamine, preferably at least one of R^4, R^5 and R^6 is alkyl having a chain length of from about 2 to about 24 carbon atoms, or an alkoxy alkyl group containing from about 2 to about 12 carbon atoms.

Some examples of preferred bulky amine polymers are cationic guar gums having the following structures, wherein "guar" represents the guar gum backbone:

(II)

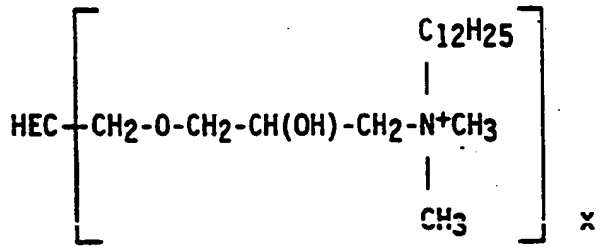


(III)



An example of a bulky amine hydroxyethyl cellulose (HEC) polymer is:

(IV)



The "x" in the above formulae is typically selected to provide a degree of substitution of from about 0.5 to about 4, preferably from about 1 to about 2.5. These "bulky amine" groups have no odor problem and also have improved skin conditioning benefits.

The composition of this invention preferably comprises from about 0.01% to about 5%, preferably from about 0.04% to about 2%, of the polymer. Some preferred cationic guars (galactomannans) are disclosed in U.S. Pat. No. 4,758,282, Stober et al., issued July 19, 1988, incorporated herein by reference. The cationic guar gum polymers disclosed in commonly assigned U.S. Pat. Application Ser. No. 07/456,065, J.R. Knochel and P.E. Vest, filed Dec. 21, 1989, are suitable, especially when the cationic groups are substituted with bulky amine groups.

For a homologous series of compounds (e.g., tri-substituted amines), volatility of the amine which can be generated upon decomposition decreases with increasing molecular weight. Volatility is dependent, among other things, on the boiling point of

the neat amine component. Odor impact also has a strong dependence on the amount of volatilized material that reaches the nose. Adding "bulky" amine groups has a desirable effect on volatility and, hence, odor impact of amines. For pure hydrocarbon substitution, the larger the alkyl chains (or the larger the degree of long chain substitution) the lower the odor impact. Thus, the preferred bulky amine substituents have boiling points of greater than ambient temperature, and preferably at least about 30°C, more preferably more than about 80°C.

The preferred nonionic polymers have little detergent surfactant activity. The nonionic surfactant-polymers disclosed in the Examples of U.S. Pat. No. 3,962,150, supra, can be used as foam enhancers if they are used at a level which raises the viscosity of the composition by at least about 1 cps. Suitable nonionic polymers include polyalkylene glycol, e.g., ethylene glycol polymers which include polymers having other groups such as alkyl or acyl groups present. For example, polyethyleneglycol (20-500) distearate, or equivalent materials, can be used and can raise the viscosity the desired amount.

Some additional polymers include polyvinylpyrrolidone and copolymers of vinylpyrrolidone such as those containing vinyl acetate, dimethylaminoethylmethacrylate and quaternary versions of the same with methyl sulfates, and polymers and copolymers of vinyl alcohol and vinyl acetate. Some acrylic polymers include polyacrylic acid, polyacrylamide, copolymers with esters of acrylic acid and methacrylic acid and copolymers of methylvinylether and maleic anhydride.

The Squeeze Foamer Container

Squeeze foamer packages are well known as exemplified by the disclosures in the following patents that are incorporated herein by reference. U.S. Pat. Nos.: 3,709,437, Wright, issued Jan. 9, 1973; 3,937,364, Wright, issued Feb. 10, 1976; 4,022,351, Wright, issued May 10, 1977; 4,147,306, Bennett, issued Apr. 3, 1979; 4,184,615, Wright, issued Jan. 22, 1980; 4,598,862, Rice, issued July 8, 1986; and 4,615,467, Grogan et al., issued Oct. 7, 1986; and French Pat. 2,604,622, Verhulst, published Apr. 8, 1988.

The above containers (packages) do not use any propellant and are therefore safe for the consumer and the environment. They create a foam from almost any surfactant composition. Although there is no need to add foam boosters merely for the purpose of stabilizing the foam, such materials can be desirable. In some compositions the use of foam boosters can even be counterproductive since the foam has to break in order for the container to work properly. The composition is placed in the container reservoir (plastic squeeze bottle). Squeezing the container with the hand forces the composition through a foamer head, or other foam producing means, where the composition is mixed with air and then through a homogenizing means that makes the foam more homogeneous and controls the consistency of the foam. The foam is then discharged as a uniform, non-pressurized aerated foam.

The minimum pressure to activate the squeeze foamer is about 1 psig, typcally from about 2 psig to about 7 psig. The minimum pressure is related to the size of the channels in the dispenser, the viscosity of the composition, etc.

In general, the density of the foam should be between about 0.002 and about 0.25 g/cc, preferably between about 0.01 and about 0.12 g/cc, and more preferably between about 0.02 and about 0.07 g/cc. Foam density is inversely related to the Creamy Feel Rating, so lower foam densities are preferred.

Optional Components

The compositions of the present invention can contain optional components such as those conventionally found in personal cleansing products. Conventional antibacterial agents can be included in the present compositions at levels of from about 0.1% to about 4%, preferably from about 0.2% to about 1%. Typical antibacterial agents which are suitable for use herein are 3,4-di- and 3,4',5-tribromosalicylanildes; 4,4'-dichloro-3-(trifluoromethyl)carbanilide; 3,4,4'-trichlorocarbanilide; phenoxy ethanol or propanol; chlorhexidene salts; hexamidine salts; Irgasan DP 300 (Triclosan); salicylic acid; parachlorometaxylenol; Octopirox; and mixtures of these materials. Conventional nonionic emollients can be included as additional skin conditioning agents in the compositions of the present invention at levels up to about 20%,

preferably at levels of from about 1% to about 15%. Such materials include, for example, mineral oils, fatty sorbitan esters (see U.S. Pat. No. 3,988,255, Seiden, issued Oct. 26, 1976, incorporated by reference herein), lanolin and lanolin derivatives, esters such as isopropyl myristate and triglycerides such as coconut oil.

Free fatty acid such as coconut fatty acid can be added to the compositions herein to improve the volume and quality (creaminess) of the lather produced by the compositions herein.

Conventional perfumes, dyes, preservatives, and pigments can also be incorporated into compositions of the invention at levels up to about 1.5%. Perfumes are preferably used at levels of from about 0.1% to about 1%, and dyes and pigments are preferably used at levels of from about 0.001% to about 0.5%.

A preferred composition of this invention also contains up to about 20% moisturizer, preferably one selected from glycerin and free fatty acid or mixtures thereof. The more preferred compositions contain from about 1% to about 15% moisturizer.

Other optional components are disclosed in the patents incorporated herein by reference.

Foam Creamy Feel Rating Test

The Foam Creamy Feel Rating test is used to measure the foam quality or creamy feel of foams produced from squeeze foamer packages. Foam Creamy Feel Rating is defined as a combined measurement of the firmness (body or substantivity) and lubricity of the foam in the hands. Foams are evaluated and graded on a 9 point scale relative to product standards which have assigned values.

I. Rating Scale

A scale of "Foam Creamy Feel Ratings" of 1 to 9 is used for creamy feel with 1 being the least creamy and 9 the most creamy. Assigned values for creamy feel are:

Foam Creamy Feel Rating	Standard
1.0	Hand lathered liquid hand soap (defined below)
5.5	Foaming solution out of commercial squeeze foamer package
7.0	Hand lathered bar soap

II. Calibration: Composition of Standards and Foam Generation

Prewash hands with liquid hand soap prior to calibration.

A. Liquid Hand Soap

Composition	% Active
Potassium Soap (50 oleic/50 lauric)	26
Free Fatty Acid (50 oleic/50 lauric)	1.8
Potassium Acetate	4
Glycerin	2
Opacifier	0.4
EDTA	0.1
Water	Balance

Foam Creamy Feel Rating = 1.0

Procedure

1. Wet hands.
2. Dispense 1 gram of liquid hand soap into hand.
3. Add a little water (0.5 cc) and rub both hands together in a circular motion 5 times.
4. Completely rotate hands 20 times, scrape lather onto a countertop.
5. Judge the firmness and lubricity of the foam by compressing it and rubbing it on the countertop and in your hands. This is a Foam Creamy Feel Rating of 1.

B. Foaming Solution/Foamer Package

Composition	% Active
Sodium Myristoyl Glutamate	5.0
Lauroyl Diethanolamide	5.0
Cocoamidopropyl Betaine	0.75
Sodium Lauroyl Sarcosinate	0.75

Foam Creamy Feel Rating = 5.5

Commercial Squeeze Foamer Package

Bottle manufactured by Kunstoff, Ltd., Uster, Switzerland, consisting of:

1. 150 ml round HDPE/LDPE (High Density Polyethylene/Low Density Polyethylene) bottle
2. Standard push-pull, off-on, dispensing head

3. "White" mixing chamber
4. 11.5 mm long dip tube with 2.0 mm diameter

Procedure

1. The dispensing bottle should be filled with between 40 and 90 mls of foaming solution.
2. Wet hands.
3. The foam is produced by squeezing the foamer package and dispensing ~1.5 grams of foam onto the countertop.
4. Judge the firmness and lubricity of the foam by compressing it and rubbing it on the countertop and in your hands. This is a Foam Creamy Feel Rating of 5.5.

C. Bar Soap

Composition (Approximate)	% Active
Sodium Cocoyl Isethionate	50
Sodium Soap (80% tallow/20% coconut)	12
Stearic Acid	18.5
Coconut Fatty Acid	3
Sodium Linear Alkylbenzene Sulfonate	1.1
Sodium Isethionate	0.6
Na_2SO_4	0.5
Water and Miscellaneous Ingredients	Balance

Foam Creamy Feel Rating = 7.0

Procedure

1. Soak bar in 95°F water for 2 minutes prior to test to precondition it.
2. Wet hands with 95°F (about 35°C) water.
3. Rotate the bar of soap 6 complete times in your hand.
4. Add a little water (0.5 cc) and rub both hands together in a circular motion 5 times.
5. Completely rotate hands 20 times, scrape lather onto a countertop.
6. Judge the firmness and lubricity of the foam by compressing it and rubbing it on the countertop and in your hands. This is a Foam Creamy Feel Rating of 7.

III. Foam Rating Procedure

1. Wet hands.
2. Dispense ~1.5 grams of foam from the foam generating package onto the countertop.
3. Judge the firmness and lubricity of the foam by compressing it and rubbing it on the countertop and in your hands. Assign the foam a rating relative to the standards on the 9 point scale.

The products of this invention should all have Foam Creamy Feel Ratings of at least about 5 or, preferably, higher as determined by this test. More preferred Foam Creamy Feel Ratings of 6 and above have not been observed in any prior art compositions. The most preferred Foam Creamy Feel Ratings of 7 and above are normally only achieved with higher levels of surfactant and are not possible without the polymer in a squeeze foamer composition.

Test Protocol for Measuring Low Viscosity Liquids

Equipment needed:

Brookfield LVT Viscometer; and

Brookfield UL Adaptor

Measurement method:

1. Level viscometer;
2. Rinse sample chamber and spindle with 70°F (about 21°C) water and then dry;
3. Attach spindle;
4. Insure that sample to be tested is at 70°F;
5. Add 16 ml sample to test chamber pouring smoothly to insure bubbles are not formed (other model UL Adaptors may require 18.5 ml samples);
6. Slide test chamber over spindle and attach to viscometer;
7. Energize viscometer and rotate spindle at highest allowable speed (60 rpm for samples <10 cps);
8. Allow time for reading to stabilize ~30 sec., then depress clutch and turn off the motor while the reading is in view;
9. The reading from Step 8 should be corrected and then multiplied by the factor appropriate for the spindle speed (see below);

10. Rinse the chamber and spindle well in 70°F water, and test the next sample; and
11. Occasionally check the accuracy of the viscometer with standards.

Correction factors:

@ 60 rpm viscosity cps = (spindle reading - 0.4) x 0.1

@ 30 rpm viscosity cps = spindle reading x 0.2

For more details refer to Brookfield's published instructions.

The following examples are presented by way of illustration only.

In general, making procedures common to those used for conventional liquid detergent compositions are employed. The squeeze foamer package used was either a Kunstoff Supermatic® package, or a slightly modified one. Comparative results reported use the same type of package.

EXAMPLE I

Formula 1

Ingredient	% Active
Sodium Myristoyl Glutamate	5.0
Lauroyl Diethanolamide	5.0
Cocoamidopropyl Betaine	0.75
Sodium Lauroyl Sarcosinate	0.75
Dowicil 200	0.2
Fragrance	0.05
Water	88.25

Viscosity:	2.4
Foam Creamy Feel Rating:	5.5
Foam Density:	0.05
pH:	~6.7

Formula 1 is a good foaming composition without polymer having a viscosity of 2.4 and a Foam Creamy Feel Rating of 5.5. Formula 2 is a preferred composition with polymer having a viscosity of 7.1 and a Foam Creamy Feel Rating of 6.4. Formula 3 is another preferred composition with polymer having a viscosity of 5.3 and a Foam Creamy Feel Rating of 7.5.

Formula 2

Ingredient	% Active
Mono Coconut Alkyl Phosphate (Quadrol Salt)	2.5
Cocoamidopropyldimethylamine Oxide (Standamox CAW)	0.5
Potassium Coco(hydrolysed Animal Protein) (Lamepon S, 32%)	0.03
1,3-Butylene Glycol	2.5
Glycerine	2.0
Aloe	0.5
Methyl Paraben	0.5
Propyl Paraben	0.2
Xanthan Gum (Keltrol T)*	0.05
Fragrance	0.05
FD&C #2	0.0017
Water	Balance

Viscosity:	7.1
Foam Creamy Feel Rating:	6.4
Foam Density:	0.07

*Keltrol T is a polysaccharide made by Kelco, San Diego, Calif., and has a molecular weight of about 2,000,000.

Formula 3

Ingredient	% Active
Coco Amphocarboxyglycinate/Sodium Lauryl Sulfate (Miranol 2MCA mod., 39.5%)	2.8
N-lauryl-iminopropionic acid (Deriphat 160C, 28%)	2.8
Glycerine	5.0
Hydroxyethylcellulose (HEC) Gum (Natrosol 250HR)*	0.09
Euxyl K400	0.2
Fragrance	0.1
Water	Balance

*Molecular Weight: -1,000,000

Viscosity:	5.3
Foam Creamy Feel Rating:	7.5
Foam Density:	0.04
pH:	7.8

Formula 4

Ingredient	% Active
Sodium Myristoyl Glutamate	1.09
Lauramide Diethanolamide	1.09
Cocoamidopropyl Betaine	0.16
Sodium Lauroyl Sarcosinate	0.16
HEC Gum (Natrosol 250MXR)	0.16
Dowicil 200	0.2
Fragrance	0.05
Water	Balance

Viscosity:	4.5
pH:	7.2

Formula 5

Ingredient	Percentage W/W
Coco Amphocarboxyglycinate/ Sodium Lauryl Sulfate (Miranol 2MCA mod., 39.5%)	0.56 (Active Level)
Deriphat 160C	1.69 (Active Level)
Hydroxyethylcellulose (1% solution)	10.05
Glycerol	15.00
Ammonium Chloride	1.00
Euxyl K400	0.20
Fragrance	0.10
Citric Acid (10% solution)	to pH 7.0
Water	Balance

EXAMPLE II

In Example II, Formula A without polymer has a viscosity of 1.5 and a Foam Creamy Feel Rating of 5.2. Formulas B, C and D, each with a very small amount of polymer added, show increased viscosities and increased Foam Creamy Feel Ratings. Formula E has

three times the active detergent surfactant, but the same viscosity as Formulas B, C and D.

	Formulas (% Active)				
Ingredient	A	B	C	D	E
Sodium Cocoyl Glutamate	7.3	7.3	7.3	7.3	22.6
HEC Gum (Natrosol 250MXR)*	-	0.14	-	-	-
PEG 150 Distearate**	-	-	1.85	-	-
JR400 Gum (Quaternized Cellulose)***	-	-	-	0.27	-
Water	Bal.	Bal.	Bal.	Bal.	Bal.

*Molecular Weight: ~720,000
**Molecular Weight: ~ 7,000
***Molecular Weight: ~400,000

Viscosity:	1.5	5.0	5.0	5.0	5.0
Foam Creamy Feel Rating:	5.2	6.5	6.3	6.8	7.0

	Formulas (% Active)	
Ingredient	F	G
Sodium Myristoyl Glutamate	5.0	5.0
Lauroyl Diethanolamide	5.0	5.0
Cocoamidopropyl Betaine	0.75	0.75
Sodium Lauroyl Sarcosinate	0.75	0.75
PEG 150 Distearate	-	1.0
Dowicil 200	0.2	0.2
Perfume	0.05	0.05
Water	Balance	Balance
Viscosity	2.4	5.0
Foam Creamy Feel Rating	4.8	6.5

EXAMPLE III

In Example III, Formulas 1 and 2; 3 and 4; 5 and 6; 7 and 8; 9 and 10; 11 and 12; 13 and 14, are side-by-side comparisons, with and without polymer formulations. The balance of Formulas 1-22 is water.

	Formulas (% Active)			
Ingredient	1	2	3	4
Sodium Cocoyl Glutamate	5.0	5.0	11.5	11.5
HEC Gum (Natrosol 250MXR)	-	0.165	-	0.120
Viscosity	1.3	5.1	2.0	5.1
Foam Creamy Feel Rating	4.6	7.4	5.8	6.7
Foam Density	0.09	0.05	0.07	0.06

	Formulas (% Active)			
Ingredient	5	6	7	8
Sodium Myristoyl Glutamate	2.17	2.17	5.0	5.0
Lauroyl Diethanolamide	2.17	2.17	5.0	5.0
Cocoamidopropyl Betaine	0.33	0.33	0.75	0.75
Sodium Lauroyl Sarcosinate	0.33	0.33	0.75	0.75
Total Wt.% Active	5.0	5.0	11.5	11.5
HEC Gum (Natrosol 250 MXR)	-	0.150	-	0.100
Viscosity	1.5	5.0	2.4	5.2
Foam Creamy Feel Rating	4.8	6.3	5.3	6.3
Foam Density	0.07	0.07	N/A	0.07

	Formulas (% Active)			
Ingredient	9	10	11	12
Monoalkyl Phosphate (Miranol L-100) (Quadrol salt)	5.0	5.0	11.5	11.5
HEC Gum (Natrosol 250MXR)	-	0.150	-	0.113
Viscosity	1.3	5.2	1.8	5.0
Foam Creamy Feel Rating	5.5	6.5	5.5	7.3
Foam Density	0.06	0.08	N/A	N/A

N/A = Not available.

Ingredient	Formulas (% Active) 13	14	15	16
Potassium Coco(hydrolysed Animal Protein) (Lamepon S, 32%)	2.26	2.26	5.19	5.19
Coco Amphocarboxyglycinate/ Sodium Lauryl Sulfate (Miranol 2MCA mod., 48%)	1.03	1.03	2.36	2.36
Palm Kernel Oil Fatty Acid Sarcosinate (Medialan KF, 40%)	0.85	0.85	1.96	1.96
N-lauryl-iminopropionic acid (Deriphat 160C, 28%)	0.86	0.86	1.98	1.98
Total Wt.% Active	5.0	5.0	11.5	11.5
HEC Gum (Natrosol 250MXR)	-	0.150	-	0.135
Viscosity	1.3	5.2	1.7	5.0
Foam Creamy Feel Rating	4.8	6.8	5.0	7.0
Foam Density	0.08	0.08	0.07	0.05

EXAMPLE IV

In Example IV, Formulas 1, 4, 7, 10, 13 and 16 have no polymer.

Ingredient	Formulas (% Active) 1	2	3	4	5
Sodium Cocoyl Glutamate	1.0	1.0	1.0	3.0	3.0
HEC Gum (Natrosol 250MXR)	-	0.180	0.255	-	0.170
Water	Bal.	Bal.	Bal.	Bal.	Bal.
Viscosity	1.1	5.2	8.5	1.2	5.0
Foam Creamy Feel Rating	3.1	6.1	7.0	5.1	6.8
Foam Density	0.05	0.04	0.06	0.04	0.04

Ingredient	Formulas (% Active) 6	7	8	9
Sodium Cocoyl Glutamate	3.0	5.0	5.0	5.0
HEC Gum (Natrosol 250MXR)	0.255	-	0.165	0.230
Water	Bal.	Bal.	Bal.	Bal.
Viscosity	8.6	1.3	5.1	8.5
Foam Creamy Feel Rating	7.4	4.6	7.4	6.9
Foam Density	0.03	0.04	0.035	0.03

Note that Formulas 1-6 have from about 97% to about 99% water, and the Foam Creamy Feel Ratings of 2; 3; 5, and 6 are, respectively, 6.1; 7.0; 6.8; and 7.4.

Ingredient	Formulas (% Active) 10	11	12	13	14
N-lauryl-iminopropionic acid (Deriphat 160C, 28%)	0.5	0.5	0.5	1.5	1.5
Coco Amphocarboxyglycinate/ Sodium Lauryl Sulfate (Miranol 2MCA mod., 39.5%)	0.41	0.41	0.41	1.23	1.23
Total Surfactant	0.91	0.91	0.91	2.73	2.73
HEC Gum (Natrosol 250MXR)	-	0.185	0.260	-	0.175
Water	Bal.	Bal.	Bal.	Bal.	Bal.
Viscosity	1.1	4.9	8.2	1.2	4.8
Foam Creamy Feel Rating	3.8	6.8	6.6	4.1	7.2
Foam Density	0.05	0.045	0.04	0.05	0.025

Ingredient	Formulas (% Active) 15	16	17	18
N-lauryl-iminopropionic acid (Deriphat 160C, 28%)	1.5	2.5	2.5	2.5
Coco Amphocarboxyglycinate/ Sodium Lauryl Sulfate (Miranol 2MCA mod., 39.5%)	1.23	2.06	2.06	2.06
Total Surfactant	2.73	4.56	4.56	4.56
HEC Gum (Natrosol 250MXR)	0.250	-	0.165	0.242
Water	Bal.	Bal.	Bal.	Bal.
Viscosity	8.3	I.3	4.9	8.6
Foam Creamy Feel Rating	7.8	4.0	6.4	7.6
Foam Density	0.035	0.05	0.03	0.03

EXAMPLE V

Rich Foam Quality Using High Surfactant Levels in Squeeze Foamer

Ingredient	Test Formulas (Wt.% Active) A	B	C
Sodium Cocoyl Glutamate	22.00	-	-
Coco Amphocarboxyglycinate/ Sodium Lauryl Sulfate (Miranol 2MCA mod., 48%)	-	5.16	-
Palm Kernel Oil Fatty Acid Sarcosinate (Medialan KF, 40%)	-	4.28	-
N-lauryl-iminopropionic acid (Deriphat 160°C, 28%)	-	4.32	-
Potassium Coco(hydrolysed Animal Protein) (Lamepon S, 32%)	-	11.39	-
Sodium Laureth Sulfate	-	-	17.7
Total Wt.% Active	22.00	25.15	17.7
Viscosity	4.9	5.1	5.0
Foam Creamy Feel Rating	6.6	7.5	6.0

It is clear from the above Comparative Examples that the compositions of the present invention have improved Foam Creamy Feel Ratings as compared to the same compositions without the polymers.

Claims

1. A liquid personal cleansing composition, packaged in a squeeze foamer container, said composition comprising from about 0.1% to about 16% by weight of a surfactant selected from the group consisting of synthetic detergent surfactant, soap, and mixtures thereof; from about 60% to about 99% water; and from about 0.01% to about 5% by weight of viscosity enhancing polymer; wherein said viscosity enhancing polymer accounts for a rise in the viscosity of the composition (without the polymer) of at least about 1 centipoise.

2. The personal cleansing composition of Claim 1 wherein said surfactant is essentially synthetic detergent surfactant and said water level is at least 75% water.

3. The personal cleansing composition of Claim 2 wherein said composition contains from about 1% to about 8% of synthetic detergent surfactant selected from the group consisting of: alkyl sulfates, alkyl glyceryl ether sulfonates, anionic acyl sarcosinates, methyl acyl taurates, fatty acyl glycinates, N-acyl glutamates, alkyl glucosides, acyl isethionates, alkyl sulfosuccinates, alpha-sulfonated fatty acid salts; alpha-sulfonated methyl ester salts, alkyl phosphate esters, ethoxylated alkyl phosphate esters, methyl glucose esters, acyl/protein condensates, betaines, sultaines, alkyl ether sulfates with 1 to 12 ethoxy groups or mixtures with trialkylamine oxides, and mixtures thereof, wherein said synthetic detergent surfactant contains alkyl chains containing from about 8 to about 22 carbon atoms.

4. The personal cleansing composition of Claim 3 wherein said synthetic detergent surfactant is selected from the group consisting of: C_8-C_{18} monoalkyl phosphates, N-(C_8-C_{18} acyl)glutamates, C_8-C_{18} fatty acyl glycinates, C_8-C_{18} alkyl imino acetates and/or imino propionates, and mixtures thereof.

5. The personal cleansing composition of Claim 2 containing from about 1% to about 8% of said synthetic detergent surfactant and from about 80% to about 98% water; wherein said polymer raises the viscosity above the viscosity of said composition without said polymer by from about 2 to about 10

6. The personal cleansing composition of Claim 2 wherein said polymer is present at from about 0.04% to about 2% by weight.

7. The personal cleansing composition of Claim 2 wherein said pH is from about 4.5 to about 8.5.

8. The personal cleansing composition of Claim 1 wherein said polymer has a molecular weight of from 2,000 to 3,000,000 and is selected from the group consisting of:

(I) anionic, nonionic, and cationic polysaccharides;

(II) copolymers of said saccharides (I) and synthetic monomers;

(III) synthetic water-soluble and water-dispersible polymers; and

(IV) mixtures thereof.

9. The personal cleansing composition of Claim 8 wherein said polymer is present at a level of from about 0.04% to about 2% and he viscosity is raised from abut 2 to about 10 centipoise; wherein said detergent surfactant is selected from soap, synthetic detergent surfactant, and mixtures thereof.

10. The personal cleansing composition of Claim 9 wherein said composition contains from about 1% to about 8% of synthetic detergent surfactant selected from the group consisting of: alkyl glyceryl ether sulfonates, anionic acyl sarcosinates, methyl acyl taurates, fatty acyl glycinates, N-acyl glutamates, alkyl glucosides, acyl isethionates, alkyl sulfosuccinates, alpha-sulfonated fatty acid salts; alpha-sulfonated methyl ester salts, alkyl phosphate esters, ethoxylated alkyl phosphate esters, methyl glucose esters, acyl/protein condensates, betaines, sultaines, alkyl ether sulfates with 1 to 12 ethoxy groups or mixtures with trialkylamine oxides, and mixtures thereof, wherein said synthetic detergent surfactant contains alkyl chains containing from about 8 to about 22 carbon atoms.

INTERNATIONAL SEARCH REPORT

International Application No PCT/US91/01390

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC(5): C11D 1/12,C11D 3/37

U.S.CL.: 252/173,252/174.17,252/174.23,252/549

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System :	Classification Symbols
U.S.CL.	252/173,252/174.17,252/174.23
	252/549

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category * :	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
Y	US, A, 4,678,606 (AKHTER ET AL) 07 July 1987 See abstract; column 3, line 35-50; column 5, lines 1-10; column 8, claims 1 and 2.	1-3,6-9
Y	US, A, 4,491,539 (HOSKINS ET AL) 01 January 1985 See abstract: column 4, line 60 to column 5, line 40 and column 7, lines 15-65.	1-3,6-9
Y	US, A, 4,022,351 (WRIGHT) 10 May 1977 See abstract.	1-3,6-9
Y	US, A, 4,812,253 (SMALL ET AL) 14 March 1989 See column 17, line 53 and column 19, claim 19.	1-10
Y	US, A, 4,946,618 (KNOCHEL ET AL) 07 August 1990 See abstract and column 7 lines 5-20.	1-10

* Special categories of cited documents: [15]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
23 MAY 1991	02 JUL 1991
International Searching Authority [1]	**Signature of Authorized Officer [20]**
ISA/US	ALEX GHYKA

Form PCT/ISA/210 (second sheet) (May 1986)